



# Bending Light Through Liquids

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## TOOLS:

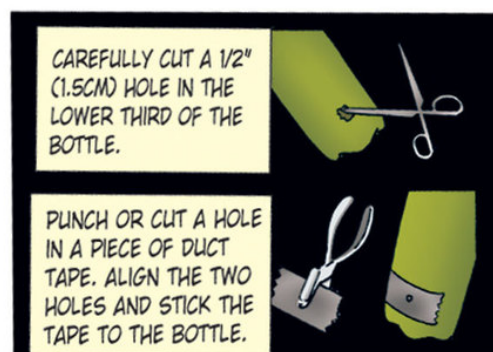
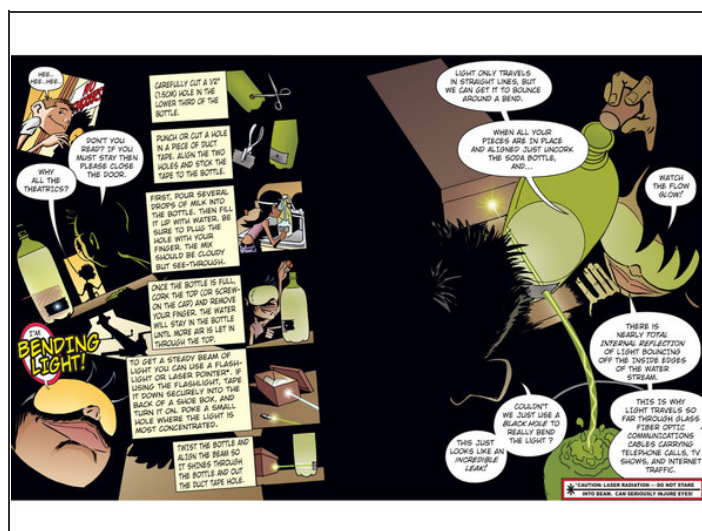
- [Scissors \(1\)](#)



## PARTS:

- [Plastic bottle \(1\)](#)  
*[like an empty 2-liter soda bottle.](#)*
- [Duct tape \(1\)](#)
- [Water \(1\)](#)
- [Milk \(1\)](#)
- [Flashlight \(1\)](#)
- [Box \(1\)](#)  
*[like a shoe box](#)*
- [Container \(1\)](#)  
*[big enough to catch the liquid](#)*


## Step 1 — Bending Light Through Liquids



- Click the upper left corner of the comic to view full size!
- Carefully cut a 1/2" (1.5cm) hole in the lower third of the bottle.
- Punch or cut a hole in a piece of duct tape. align the two holes and stick the tape to the bottle.
- First, pour several drops of milk into the bottle. Then fill it up with water. Be sure to plug the hole with your finger. The mix should be cloudy but see-through.
- Once the bottle is full, cork the top (or screw on the cap) and remove your finger. The water will stay in the bottle until more air is let in through the top.

## Step 2



- To get a steady beam of light you can use a flashlight or laser pointer. If using the flashlight, tape it down securely into the back of a shoe box, and turn it on. Poke a small hole where the light is most concentrated.
- **Caution:** do not stare into laser pointer beam. It can seriously damage your eyes! 
- Twist the bottle and align the beam so it shines through the bottle and out the duct tape hole.
- When all your pieces are in place and aligned just uncork the soda bottle, and watch the flow glow.
- There is nearly *total internal reflection* of light bouncing off the inside edges of the water stream.
- This is why light travels so far through glass fiber optic communications cables carrying telephone calls, TV shows, and Internet traffic.

This project first appeared in [MAKE Volume 05](#), page 168.

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